Light and Lighting

Vol. XLI.—No. 12 December, 1948 Price: One Shilling

FIRST AEROPLANE CROSSING OF THE CHANNEL. Louis Bleriot was the first man to cross the English Channel in a "heavier-than-air" flying machine. This historic flight of 25 miles was made from Calais to Dover on July 25th 1909.

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Christmas Greetings

(From the I.E.S. President)

The Editor has kindly put this space at my disposal, so that I may send to all readers and I.E.S. members my personal greetings, and good wishes for a very happy Christmas this year, with still happier ones to come.

I hope that in 1949 we may see good progress in our own arts and sciences, and progress towards peace, goodwill and stability throughout the world.

Yours very sincerely

Jim Waldram

Illumination Notes and News

The Value of Visits

Travel, so the saying goes, broadens the mind. The truth of this, no doubt, depends on who is travelling where; but in general it is true both for travel within and beyond the boundaries of this country. In the lighting world we find that some people believe that trips to the other side of the Atlantic are an essential ingredient of the mind-broadening process. Others are content with trips, perhaps rather more frequent, to our Continental neighbours. Some of us, however, find that our activities are confined to the more or less restricted circle of our daily work, and it is for this reason that opportunities to see aspects of lighting outside our normal routine and a chance to study the other man's job are so welcome. Such opportunities are afforded to I.E.S. members by the visits which have recently been reintroduced into the I.E.S. programme.

The two visits held last session and the four arranged for the present session include visits to the research laboratories of the General Electric and the British Thomson-Houston companies; the Chislet colliery, in Kent, to see the experimental fluorescent lighting at the coal face; a visit (an account of which appears elsewhere in this issue) to the Southampton Docks to see the new quay lighting, and many other interesting things. The two visits yet to be held are a visit to a London theatre to see the stage lighting, and a visit to a glassworks.

Those who have taken part in these visits are unanimous in their opinion that they have not only been most enjoyable but also instructive, and it is apparent that these events are becoming very popular.

These visits usually mean that those taking part must take time off from their normal duties, which, it would seem, prevents many from taking part who would otherwise be glad to do so. This is particularly so of the younger members of the I.E.S., and it is a great pity that they should thus be debarred from extending their lighting knowledge in this way. It is understood that in arranging their programme the I.E.S. are anxious to meet the needs of their junior members, and hope that every encouragement will be given to them to take an active part in both meetings and visits.

The Next I.E.S. Sessional Meeting in London

On January 11 a paper entitled *Transport Lighting with Fluorescent Lamps* will be presented by Mr. H. R. Ruff, Mr. J. N. Hull and Mr. R. V. Mills at a meeting of the I.E.S. to be held at the Lighting Service Bureau, 2, Savoy Hill, W.C.2, at 6 p.m.

The paper reviews the problems involved and describes the characteristics of lamps and circuits. The latest types of lighting equipment and control gear are described, and the paper concludes with a detailed account of the application of fluorescent lighting to specific classes of vehicles.

Poor School Lighting

Our attention has been called to the following paragraph which appeared in "The Teachers World" for November 24, 1948. "The gas lighting at Cudworth Primary School is so poor that sometimes the mantles cannot be lighted. A newspaper reporter was told by a master last week that the lighting was so inadequate that he could not see the boys at the back of the room. Parents and managers of the school are very concerned at the condition of the lighting, and even the possibility of a 'strike' has been mentioned as a means of stirring West Riding Education Committee. It is a remarkable thing that old St. John's School, Cudworth, has now installed the latest fluorescent lighting system. The premises are used as a stocking factory."

Is it not time that strenuous efforts were made to bring the artificial lighting in school buildings—particularly the older ones—up to modern standards?

An Illumination Levels Indicator

Known as the Holophane Calculux, an illumination levels indicator has been produced by the Holophane Company, Inc., of New York. The indicator consists of two concentric discs, on the larger of which is printed a series of radial lines at the periphery, these lines being of different thickness so that their angular subtense ranges from one to six minutes of arc when viewed at a distance of 14 inches. Inside the band occupied by these lines is a graduated grey band in which a number of holes are punched, so that when the indicator is laid on a surface whose reflection factor is to be estimated the brightness of this surface can be matched with that of some part of the grey band. In a third band on the large disc values of illumination are printed, the values given being those adequate for three levels of visual performance, viz., 90 per cent., 95 per cent., and 98 per cent. of the maximum attainable, when the task considered involves any of the sizes given and any of the values of reflectance difference which are indicated on the smaller of the two discs, which is rotatable. It is stated that the indicator is "based on H. C. Weston's method," and the levels of illumination given are "Weston's experimentally measured levels" and others computed from the data given in his reports published jointly by the Medical Research Council and the D.S.I.R. some years ago. Instructions for using the indicator are printed on it, and it is supplied in a stiff envelope together with a booklet containing supplementary instructions, and explaining that it is based on the British method, which is a scientific one, now adopted by the Illuminating Engineering Society in Great Britain. It will be recalled that Mr. Weston himself designed a somewhat similar indicator, which he showed when introducing the new I.E.S. Code at the Sessional Meeting of the Society in November, 1945 (Trans. I.E.S., Vol. 9, No. 1, Jan., 1946). The present indicator is an improvement, for which the American Holophane Company is to be congratulated. At the same time, it is gratifying to us in this country to note the significance attached by our friends across the Atlantic to this British work, and encouraging to have this endorsement of the I.E.S. Code.

Lighting on the Trafalgar Square Christmas Tree

Though owing to the continuing power restrictions some limitation has been placed on the lighting of Christmas trees we are pleased to note that the tree presented by the Norwegian Government to London, which is to be erected in Trafalgar Square, is to be illuminated.

A New Light Source

In a paper given before the Illuminating Engineering Society in London on December 14, Dr. J. N. Aldington demonstrated the gas arc lamps which have recently been developed at the Siemens Laboratories at Preston. The term "Gas Arc" is applied to a range of xenon filled discharge tubes which are operated under conditions causing them to emit radiation of a sunlight quality. At present these lamps are water cooled.

The value of any new light source may be assessed by the extent to which it emits radiation of desirable quality, quantity and concentration. A new source may be useful in comparison with existing sources if it is improved in any one of these characteristics. The gas arc, it should be pointed out, is still in the development stage, and it is not possible to predict with any degree of accuracy what part it will play in the lighting field.

The colour of the radiation from the gas arc has been assessed by direct determination of the C.I.E. co-ordinates, by measurements of the visible spectral composition, by visual comparison of the colour appearance of test objects and by colour photography. In each case observations obtained with the xenon gas arc were found to resemble those obtained with sunlight, whilst the quality of light emitted by argon and krypton is very little different. A neon-filled lamp gives a pinkish light which more nearly approaches daylight as the current density is increased.

The luminous efficiency of the gas arc varies under different conditions of gas pressure, current, etc., but as an example of present efficiencies it is stated that a krypton arc at 5 kw. gave 20 l/w. and a similar lamp filled with xenon operated at 30 l/w. when loaded to 5 kw. The brightness is intermediate between that of the tungsten filament lamp and that of the high intensity carbon arc; the centre arc brightness of the 5 kw. gas arc with a loading of 1 kw. per centimetre of arc length is of the order of 5×10^3 stilb. Somewhat higher brightnesses are obtained with a special concentrated arc.

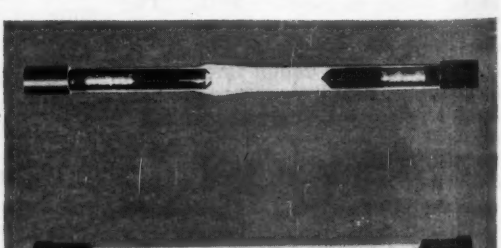
Applications

In the development of the applications for any new light source consideration must be given to such matters as light output, simplicity of operation, efficiency, colour, life and advantages over existing sources. The gas arc has the advantages of excellent colour, a cool light, immediate full light output, and fairly high concentration. To obtain these advantages it is necessary to provide water cooling, momentary high voltage for starting, and a suitable current limiting reactance or resistance.

The luminous characteristics of the gas arc make it very suitable for photographic, film, and television studio lighting on which work is already being carried out. In the case of Technicolor film applications a great advantage is the similarity of the radiation to that of daylight, so that the new lamp may be used to supplement or to simulate daylight.

The illustration below shows two versions of the 5 kw. gas arc lamp, the dimensions of each being approximately 2 cm. x 25 cm. The actual arc length is 6.5 cm. With the water flow jacket fitted the external diameter is 4 cm.

Work is proceeding on air-cooled linear forms of the gas arc, and a 750 watt air-cooled xenon lamp of the dimensions 14 mm. x 300 mm. has an efficiency of 17 l/w. While the colour of the radiation is not quite so good as the water-cooled lamp, it is sufficiently good for purposes where good colour rendering is desirable.



5 kw Gas Arc Lamp.
Upper lamp for direct current operation. (Without water jacket.)
Lower lamp for alternating current operation. (Mounted inside a water jacket.)

Lighting and Decoration in a Windowless Factory

By E. J. WARD

The following article describes the improvements which were made in the appearance of the interior of a factory by the intelligent application of lighting and colour.

In a paper* read before the Illuminating Engineering Society in London last year, Dr. J. H. Nelson stated that ". . . the role of lighting and decoration is to produce not only adequate illumination but also contribute to the general sense of well-being which is induced by pleasing surroundings." The following is an account of the intelligent application of this principle to a large radio valve works, where by the skilful use of carefully chosen colour schemes, well-planned lighting, and the screening off of certain sections, the huge building has been changed from "just another factory" to one in which it is quite definitely a pleasure to work.

The building in which this pleasing transformation has been worked is a single-storey structure between 600 and 700 ft. long, approximately 100 ft. in width, and having its floor level about 8 ft. below ground level. The arched corrugated roof is concealed on the inside by a false ceiling 20 ft. or so from the floor. The building interior has no natural lighting since there are neither windows nor roof lights, and one can only catch glimpses of the outside world when passing one or another of the doors when they are open. All lighting, therefore, is artificial, and before the changes described in this article were made the whole building was illuminated by means of row upon row of 5-ft. 80-watt fluorescent lamps in continuous metal troughing of the twin-lamp type suspended about 5 ft. from the ceiling. These troughs extended almost the full width of the building, the distance between rows being only 15 ft., so that, standing at one end of the factory building and looking down its length, one was conscious not only of a veritable forest of fittings but also of some uncomfortable glare, due to the bright streaks of light seen against the comparatively dark ceiling and upper walls, despite the fact that an attempt had been made to avoid the "tunnel effect" by using slotted troughs to allow some light to escape upwards. The effect described can be appreciated from Figure 1, which shows a portion of the factory as it was before the lighting was re-designed. At this time the general scheme of decoration was red-brown for the dado, extending to shoulder level, with a light stone colour for the upper walls and white for the ceiling.

In this large building all the operations in the fabrication of radio valves are carried out. The many component parts are made and assembled and the valves are then "pumped," tested, and finally packed for transport. At various stages in the process of construction parts of the valves, as well as assembled units, are subjected to heat treatment, and furnaces and machines burning gas are grouped together in a part of the factory which is generally referred to as the "hot-shop." Some of the operators, particularly those on the adjacent assembly lines, constantly complained of the heat and noise from this section. In replanning the factory interior, therefore, it was decided to partition off this area from the remainder; as was speedily done by means of light-alloy metal frames and

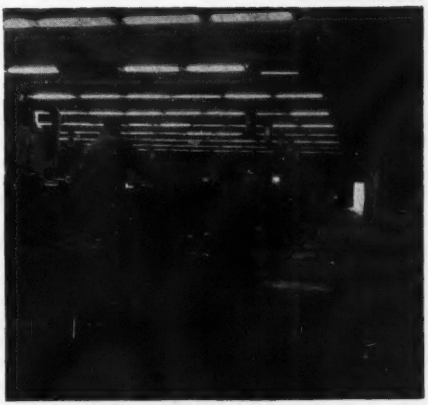


Fig. 1. Showing the old lighting system.

* Decoration and Industrial Lighting. By J. H. Nelson, Trans. Illum. Eng. Soc., 1947, Vol. XII, No. 9.

compressed wood panels. By this means the building is longitudinally divided for almost half its length into two parts, one of which now contains the hot and noisy machinery, the other being given over to what might be described as the cooler and more exacting tasks, such as assembly, etc.

On either side of this partitioning the equipment for general lighting was dismantled and lay-lights, or artificial windows, each containing five or six

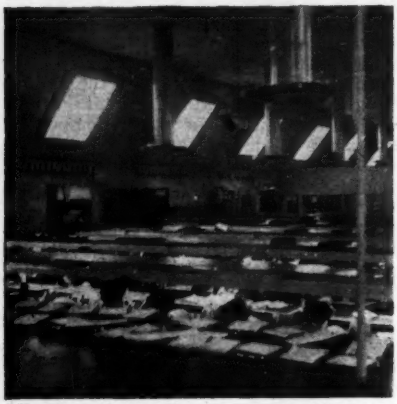


Fig. 2. Showing the new laylights.

fluorescent tubes, were placed at intervals of approximately 12 ft. along the outer walls and also along both sides of the partition close to the ceiling and at an angle of 40 degrees from the perpendicular. Sand-blasted "Perspex" is used to diffuse the light from these "windows" (Fig. 2) and to cut off direct view of the lamps. The surface brightness of the "windows" is not uniform, however, though the vertical striation observed is not pronounced and does not prevent the illusion of natural lighting. The change resulting from the introduction of this method of lighting is very striking, the whole environment being much enhanced in appearance. Gone is the forest of so obviously artificial lights. Instead the light of a sunny June sky appears to be coming through the windows on either side of the factory. So bright and "sunny" is this building now that it is with a shock of surprise that one emerges from it on a dull day to be greeted by leaden skies. Comparison of Figures 1 and 2 will give some idea of the change that has been made. It is almost impossible to believe that the second of these two pictures is not a view of a different and excellently day-lighted interior.

In the section given over to assembly, etc., the level of illumination now varies from about 20 lumens/sq. ft. at a point immediately below the top edge of a "window," to 9 lumens/sq. ft. at a point approximately midway across the shop and between two pairs of "windows." So strong, however, is the suggestion of natural illumination that one has the impression of a much higher general level of illumination than is revealed by actual photometer readings. Below is given a typical series of readings from one side of the shop to the other taken along a line approximately midway between two "windows," and at five feet intervals. As the "windows" are slightly staggered the readings are a little higher at one end of the line than at the other.

Lumens per square foot

19.0	19.0	13.5	9.5	9.0	11.0	14.5	15.0	19.0

Approx. 5 feet intervals

The average of a number of readings made under the original lighting was 13.5 lumens/sq. ft., against 14.4 for the series shown above.

Because of the high standard of accuracy demanded at every stage of manufacture of the radio valve, good local lighting for bench and machine is essential. On the assembly lines, where operators sit side by side in front of their compact electric-welding machines (Fig. 3), the benches are lighted by fluorescent lamps in continuous metal troughs at a height of 20 inches from the bench surface. The lamp ends are overlapped in the fittings to prevent as much as possible the "fall-off" of light that usually occurs at a point immediately below this spot when lamps are set end to end. Illumination readings made on the bench surfaces give an average of 90 lumens/sq. ft., rising to well above this level at a point in line with the lower electrode of the welding machine where the operator needs the best possible light.

To supplement the lighting in creating a bright and cheering environment in the assembly section, the flower-pot red

and light-stone that had formed the previous decoration has been replaced by a colour scheme in which the upper walls are distempered cream, the lower part, or dado, to shoulder height is painted a deeper shade of cream, this colour also being used on the exterior of the light-troughing above the benches and on control boxes, etc. The doors, benches, cupboards and other fitments are painted a pleasant shade of green, a broad line of which also separates the two shades of cream around the walls.

Fig. 3. Showing the bench lighting.

For the section housing the furnaces and gas-burning machinery a cooler colour scheme was devised, the upper walls being distempered pale cream whilst the lower part was painted pale green. All the overhead air-conditioning trunking, heat exhaust tubings, compressed air and other pipes, etc., are painted pale cream, as also is the maze of smaller pipes that surround each of the machines. The actual machines, benches, and other fitments in this shop are painted pale green, the whole section now having a cool, pleasant appearance with everything in harmony.

An ingenious form of lighting is used on two of the machines for making miniature valve bases. These machines, six feet or more across, and circular in shape, have large overhead funnel-shaped exhaust flues, and behind the rims of these, tailor-made cold-cathode fluorescent tubes have been installed (Fig. 4). The result is an even, almost shadowless light, exactly where it is required, the operator being able to get a clear view of the whole of her machine, including those parts farthest removed from her. Fluorescent lamps of two different colours are being tried out on these machines, the operators being asked to state a preference, though the colour of the light does not seem to be of great importance. One so frequently sees standardised lighting units attached to machines when these units are quite unsuitable that it is interesting to find an example of the intelligent use of "built-in" lighting. Many machines are designed without proper appreciation of the need for good lighting at the working point, and built-in lighting often gives the best result.

Those who undertook the re-planning and re-designing of this factory are to be congratulated for a job well done, it being a praiseworthy attempt at making the operator's lot a very much happier one.

The work was in fact undertaken by the factory staff who were, of course, in a position to give careful study to the requirements of the various workers and the nature of the tasks carried out in the different parts of the factory.

As a point of interest, it is perhaps worth recording that the photographs used to illustrate this article were taken during normal working hours, no additional lighting being used. A small reflex-type camera was used, exposures being 1-10 second at f.4 for Figs. 1, 2 and 3 and 1-25 second at f.2.8 for Fig. 4.

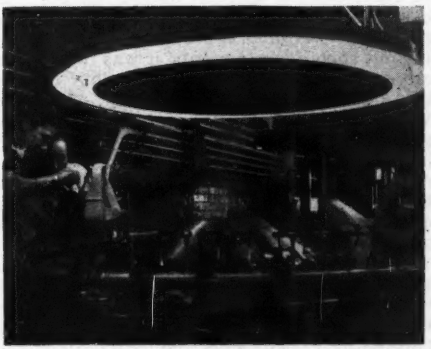


Fig. 4. An application of cold cathode tubes.

Colour Rendering by Fluorescent Light

The subjects dealt with in the two papers read at the last meeting of the Colour Group, held at the E.L.M.A. Lighting Service Bureau, on November 10, were of great interest to all lighting engineers, and to everyone interested in the effect of fluorescent lighting on the colours of objects seen by it.

These papers were originally presented at the meeting of the Colorimetry Section of the International Commission on Illumination at its recent session in Paris. The first, by Mr. G. T. Winch and Mr. H. R. Ruff, was entitled "Measurement, Representation, and Specification of Colour and Colour-Rendering Properties of Light Sources" and this was read by Mr. Winch, who said that a figure of colour temperature, such as was widely used in the U.S.A., or even the chromaticity coefficients were often very misleading as an indication of the colour-rendering properties of the light given by such a source as a fluorescent lamp. The authors of the paper mentioned various methods that had been suggested for expressing colour and colour-rendering and said that British lamp makers favoured the measurement of the relative light output in eight defined spectral bands, but because of the limited accuracy of commercially available apparatus for carrying out such measurements, it was found advisable also to measure the colour of the light in the ordinary way. Mr. Winch showed a number of diagrams, generally known as "block diagrams," in which the breadth of each rectangle represented one of the eight wave-length bands, while the height represented on a logarithmic scale the relative light output in that band.

The final part of the paper was devoted to a description of new and accurate apparatus developed for making measurements such as these; the chromaticity coefficients, the light output in each of the eight spectral bands, and the total lumens could be measured in quick succession on a single instrument.

The second paper, by Messrs. G. T. Winch, W. Harrison, and H. R. Ruff, and entitled "Fluorescent Lamp Artificial Daylight Units for Colour Matching" was read by Mr. Harrison. It was devoted mainly to a consideration of the problem of producing a source suitable for critical colour-matching purposes, and the authors described practical tubular fluorescent daylight colour-matching units utilising cold cathode tubes. The other system which, they said, was in the experimental stage, consisted of a combination of a hot cathode lamp giving blue light with incandescent tungsten filament lamps. This provided a closer approximation to the spectral distribution of a black body than was possible with fluorescent lamps alone, provided care was taken to ensure adequate mixing of the light and adjustment was made for the difference in life behaviour of the lamps supplying the two components. Such a source was capable of operating at an efficiency of the order of 30 lumens per watt and so a much higher level of illumination over a comparatively large working area became practicable.

The presentation of these papers was followed by a short but very interesting discussion, during the course of which several questions were asked regarding the choice of the wave-length limits of the eight spectral bands referred to by Mr. Winch, and in reply he said that there had been a good deal of experiment on the subject but it could not be said that the matter was finally settled. In fact, the International Commission, while recommending certain limits, had urged that further study should be given to the matter.

Mr. Donaldson said that while it might theoretically be necessary to cater for the colour rendering of an infinite number of colours, in fact, the colours practically important could be grouped into a limited number of classes so that it would be possible to select some 10 or 20 colour samples and use these for trying out the bands selected.

The meeting concluded with brief statements by Mr. R. S. Horner, Dr. W. D. Wright, and Mr. Winch on those matters dealt with by the I.C.I. in Paris, which were of special interest to members of the Colour Group. Mr. Horner dealt with definitions and Dr. Wright reported discussions regarding a standard scotopic (dark adaptation) luminosity curve and the photopic curve. Mr. Winch said that methods of choosing observers for heterochromatic visual comparisons were to be studied.

High-Speed Photography

Summary of a lecture delivered by Dr. J. W. Mitchell at the meeting of the Illuminating Engineering Society held in London on November 9, 1948

The photographic techniques which allow the details of rapidly moving objects and of rapidly changing systems to be studied have been developed largely for war-time armaments research, although they have many peace-time applications, most of which still await development.

In armaments research, the chief objects of study may be divided into two groups, viz. the non-luminous and the self-luminous. The first group includes the high velocity air disturbances produced when gases expand from jets, the air flow in supersonic wind tunnels in which aerofoil profiles are designed for high-speed flight, and the air disturbances associated with rapidly moving objects. It is possible to project sharply defined silhouettes of these objects and to photograph their surfaces. The second group (of self-luminous objects) includes flame, explosion and detonation phenomena and the associated air disturbances.

Single Photographs

In general, the first requirement in any investigation is one or more high definition single photographs which allow instantaneous configurations to be frozen for subsequent detailed study. A simple example is the shadow projection of a .303-inch bullet moving with a velocity of, say, 2,500 ft. per second, so that it moves three-hundredths of an inch in a microsecond. Clearly it is necessary to use a point source of light with an effective duration of only a few microseconds and, further, since the bullet will move right across a 12-inch photographic plate in less than half a millisecond, the flash must be timed to within 20 microseconds if the shadow is to lie within about half an inch of any selected point on the plate.

A suitable light source of short duration and high peak intensity is the electric spark produced by discharging a high voltage condenser through a spark gap with suitable electrodes made of steel, cadmium, magnesium or elektron. The condenser has a capacity of 0.1 to 0.25 microfarads and the working voltage is 7 to 10 kilovolts. The discharge is initiated by a small pilot spark fired by means of a breaking contact. The delay in initiation of the main spark is less than two microseconds.

For studying air disturbances, such as those produced by the gases expanding from the muzzle of a .303-inch rifle fitted with a flash eliminator, the schlieren method is better than the spark shadow systems, and other methods depending on the use of optical interferometer systems are likely to be used extensively in the future for such work. The light from a low-voltage spark is usually inadequate for this method because the ultra-violet which is largely responsible for the image in the shadow method is absorbed by the lens.

A much greater output of visible short-wave light can be obtained if a discharge tube is substituted for the spark gap and the condenser capacity can then be increased. For instance, if an argon-filled discharge tube is used with a one or two microfarad condenser in the circuit already mentioned, a flash can be produced with which rapidly moving surfaces can be photographed. It can be mounted at or near the centre of curvature of a concave spherical mirror or along the axis of a parabolic mirror to increase the efficiency. The effective duration of the flash is not more than a few microseconds but it has a relatively long duration tail of rapidly falling intensity. This, however, has a greater proportion of longer wave-length radiation than the initial discharge and so its effect can be minimised by using blue-sensitive plates.

The study of high-speed shells is the most exacting problem in this type of work, both as regards duration of flash and precise timing, but there are many subjects in which flashes of much longer duration will arrest all trace of motion, e.g. drop formation, splashes, mechanical fracture, insect movement, etc. For such work a small portable unit with a coiled xenon-filled tube may be used, or a high intensity tube can be used to illuminate a large area. Stereoscopic pairs of photo-

graphs may be taken just as readily as single photographs.

Self-Luminous Objects

A typical example of an event which provides its own light is a detonation. To obtain a snapshot of the detonation front and of the gases expanding behind it, an exposure of not more than one microsecond is required. A shutter which will give this speed consists of a Kerr cell between two sheets of polaroid so crossed that normally no light passes. If such a cell has applied to it an instantaneous electric stress, the nitrobenzene it contains rotates the plane of polarisation of the light passing through it and so some passes through the second polaroid and the whole system allows light to pass for the duration of the electric stress on the cell. This method is only applicable when the self-luminosity is great enough to allow a photograph to be taken in a microsecond.

A photographic record of the behaviour of metallic fragments within a white-hot cloud of gases from a detonated explosive can be obtained by using a high-intensity X-ray pulse of microsecond duration. The energy for the pulse is stored in condensers, charged in parallel to 50 kv and discharged in series, producing 300 kv across the X-ray tube.

Photographic Sequences

Although events which have a regular periodicity may be studied by taking single photographs at successively later instants in the cycle and so building up a sequence by which the course of the event may be studied, there are many events which are in no sense cyclic and which can only be studied by taking either a limited sequence of photographs at a suitable rate or else a complete cine-record.

With a non-luminous event, illumination for a limited sequence of pictures can conveniently be provided by a series of high intensity short-duration flashes produced by discharging as many condensers as flashes required through a discharge tube. The images produced by the light flashes are separated by using a drum camera in which the film is stretched round the periphery of a drum rotated at a high speed. There is, however, a limit to the speed of any mechanical movement such as this, and for many armaments phenomena the intervals between flasnes must be of the order of microseconds. A limited number of pictures may be obtained at such intervals by using what is, in effect, a multi-lens camera and a stationary film.

There are two methods of making high-speed cine records. For non-luminous events short-duration flashes are produced at regular intervals by discharging condensers through suitable discharge tubes while the film is running continuously. A rotary spark-gap controls the charging and discharging of the condenser, and if the spark-gap rotar is mounted on the same axle as the film drum, the flashes give the frame separation necessary for normal projection.

In the case of self-luminous events a high-speed camera is used; the film moves continuously through the gate and the image is moved at the same rate as the film, and thus maintained stationary with respect to it, by the use of one of three optical devices. In the first, used in the Heape and Grylls camera, the lens and film are moved at the same rate past a slit, so that the system is similar to that of the focal plane shutter, but with the shutter stationary. Cameras based on this principle tend to be large and heavy. The second system depends on the use of a rotating prism block which moves the image at the same rate as the film. The most compact system is one in which a polygonal mirror with 30 mirror facets, either external or internal, is used to move the image in company with the film.

When any of these cameras are used for photographing non-self-luminous events a very high illumination must be provided by some external source.

The techniques described are applicable to many problems other than those of warfare. For instance, they have been used in Africa to study the habits of the tsetse fly, and so to assist in combating this scourge and, in fact, it is impossible to forecast the many peace-time uses to which high-speed photography may be put in the immediate future.

Discussion

The lecture was followed by a discussion, which was opened by Mr. W. D. Chesterman, who described some features of the gear used for timing the exposure in relation to the event. He

said that the highest rate at which pictures could be taken with spinning mirror apparatus was 90 to 120,000 per second, but that by a principle being developed in U.S.A. the speed could be much increased, and pictures might eventually be taken at intervals of one-tenth microsecond.

Mr. Bicknell asked whether the "tail" to which Dr. Mitchell had referred was a serious embarrassment, and whether the lag in any triggering system could be relied upon to be constant.

Mr. Harris said that the Kerr cell technique was particularly useful for photographing a projectile-piercing armour plate, and Mr. Adams emphasised that high speeds of rotation were impossible with optical systems of useful aperture.

Mr. Walker asked how much of the tail was due to after-glow and how much to the discharge proper. He said that the Kerr cell with a valve-controlled circuit would give a reproducibility of 0.1 microseconds.

The matter of the time-intensity curve of the discharge was discussed by Mr. W. G. Standring, who said that the intensity depended very much on the current; there was more light in the first half cycle of the oscillatory discharge obtained with a low value of induction and the light was greatest if the current was developed quickly.

Mr. Bourne said that for certain purposes it was possible to obtain a very high illumination for one or two seconds by overloading a "compact source" to some five or 10 times its normal loading.

The question of the "tail" was taken up by several other speakers, one of whom suggested that a shorter flash might be obtainable if a blue filter were used, since the colour temperature of the light was at first very high and then rapidly fell. Mr. Godhlan said that in the case of a 30-microsecond flash, for example, the period for which the intensity was more than one-tenth of the peak was only five microseconds. He described a method of measuring the duration of a flash by photographing a rapidly moving disc; by combining the rate of change of density of the image with the characteristic curve of the emulsion, the light/time curve of the flash could be obtained. In his reply Dr. Mitchell said that the photographic duration of a flash was probably that for which the intensity exceeded half the peak value rather than one-tenth the peak value. He said, too, that the lag in triggering the discharge could be minimised by using a low-pressure of gas in the tube and a material of low work-function for the electrodes.

The Ettles Lecture

Taking as his subject, "The Facilitation of Visual Tasks, with Special Reference to Near Visual Problems," Mr. H. C. Weston recently delivered the twenty-third Ettles Memorial Lecture at the London School of Hygiene and Tropical Medicine.

The chair was taken by Sir Alexander Carr-Saunders, president of the Association of Optical Practitioners, under whose auspices this public lecture is given.

The lecturer pointed out that all those who, in diverse ways, are concerned with the management of sight and sights have a common purpose. Whether they be lighting engineers, optical practitioners, display artists and other designers of sights, e.g., of advertisements, traffic signs, and so on, all of them are concerned to make seeing easy. The facilitation of visual tasks can be brought about in various ways. The ophthalmologist and the optical practitioner facilitates them by rectifying ocular anomalies; it is with the organs of sight that they are primarily concerned. The lighting specialist, however, is concerned with stimulating the eyes. It is his function to create easy sights by suitably disposing light according to the nature of the objects it is expedient for us to see. Lighting is the primary means of facilitation, but, obviously, has its limitations. Often the "natural" surface characteristics of objects can be modified so as to facilitate a visual task, i.e., artificial colouring can be used. Optical devices of various sorts are widely applicable for the facilitation of industrial, professional and commercial visual tasks; and, so far as "very fine" work is concerned, the use of very high illumination is not so effective as a moderate virtual enlargement of the objects looked at. The lecture was fully illustrated by lantern slides, and will be pubished in the December issue of "The Optical Practitioner."

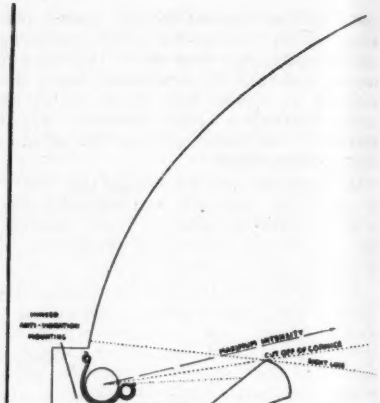
Architectural Lighting on the R.M.S. "Edinburgh Castle"

The R.M.S. "Edinburgh Castle" (28,705 tons) sailed on her maiden voyage to South Africa earlier this month. The following article describes the lighting on this vessel.

The remarkable impression of spaciousness one receives aboard this fine ship, and on her sister ship, the "Pretoria Castle," is as much the result of careful design as of the actual generous dimensions of the public rooms. The Linolite system of indirect lighting which was used has much to do with this result, the imaginative use of indirect lighting from cornices giving an effect of space which is particularly valuable in marine work, where the vertical distance between decks is often restricted. A room with a brilliantly lighted ceiling appears to be much more lofty than it really is, and with indirect lighting a room is free from distracting fitments which break up distance.

One objective of any system of hidden lighting from cornices is to throw the greatest possible concentration of light towards the middle of the ceiling from the smallest possible recess behind the cornice. This is achieved in the Linolite system aboard the "Edinburgh Castle" by using Crompton double-ended clear glass tube lamps with line filaments and trough reflectors which collect and concentrate the light from the filaments and direct it in a narrow beam obliquely at the surface of the ceiling. The secret lies in the accurate focusing of the rays from a thin filament by a reflector whose curve is designed for the particular ceiling which it is to serve. The reflectors used are made of anodised aluminium. Polished aluminium has a rather higher reflection factor than chromium plate, whilst anodising serves two purposes; firstly it protects the finely polished surface from tarnish, and secondly it prevents striation, i.e., prevents the formation of bright streaks which would spoil the hidden lighting effect on the surface illuminated.

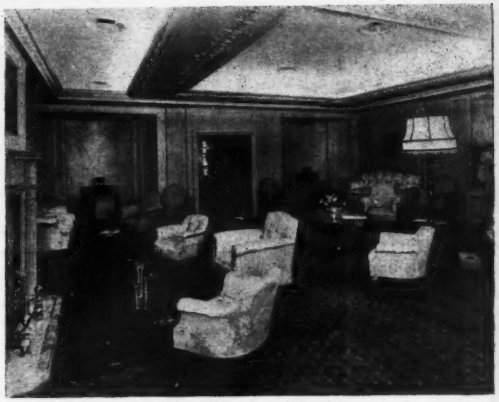
This method of lighting is perfectly exemplified in the



Standard cornice for both First-Class and Cabin-Class Dining Saloons.

The First-Class Dining Saloon.

drawing room of the "Edinburgh Castle," where a double cornice in the form of a square divides the ceiling into inner and outer areas of illumination, i.e., a square and a continuous broad surround. A ceiling of great beauty is achieved and the room has an air of serenity that comes from perfect proportions and freedom from superfluous fittings.



The Drawing Room.

The area of ceiling which could be lighted successfully by concealed lamps would be limited if the cornices holding them were confined to the walls of a large room, and the solution adopted in this ship has been to bring the cornices and coves on to the ceiling in curved and straight patterns which break it up while equally concealing the lighting strips. An outstanding example of this technique is the first-class dining saloon, where the lighted coves correspond roughly with the disposition of the dining tables and give a feeling of intimacy—almost of cosiness—in what is really a very large room.

It is in the first-class lounge, which extends through two decks, that the full effects of indirect lighting are seen at their best. This is a splendid room, well illuminated by natural light during the day and perfectly lighted by night from lamps concealed in the simple decorative walls.

Cabin-class accommodation is lighted by the same system. In the lounge an interesting feature is the agreeable decorative effect of light and shade produced by the indirect lighting of varying ceiling contours. Direct strip lighting behind 'Perspex" panels is used above the swimming pool to give an effect of warm sunlight, and a combination of central cove lighting with direct panel lamps is used in the gymnasium to give high intensity light without glare.

In the staterooms white strip wall-lamps are installed above the dressing tables and wash basins. They are in Linolite plastic moulded fittings and besides providing the brightest light where it is needed, they give a satisfactory illumination throughout the room.

A Recent Optical Convention

To mark the fiftieth anniversary of the first examination in Visual Optics by the Worshipful Company of Spectacle Makers, an Optical Convention was held at Apothecaries' Hall on November 3 and 4. Papers were read by three eminent members of the I.E.S., namely, Dr. W. D. Wright, Prof. H. Hartridge, and Dr. W. S. Stiles. Dr. Wright's paper was concerned with aspects of binocular vision, while that of Prof. Hartridge dealt with the causes of faulty refraction. Dr. Stiles, in an able paper on a difficult subject, discussed the physical interpretation of the spectral sensitivity curve of the eye. The Convention was well attended, and all the papers were followed by interesting discussions.

Film Strips on Lighting

Film strips are becoming increasingly popular as a means of illustrating lectures and talks. One of their advantages over the usual lantern slide is their compactness which enables some 30 or 40 pictures to be included on one small roll of film.

The Lighting Service Bureau announce that they are producing a series of strips on lighting, and so far have issued strips on Industrial Lighting, School Lighting, Street Lighting, and Lighting for Safety, Convenience, and Decoration in the Home. These strips may be borrowed free of charge.

New Lighting Installations

Lighting is a vital factor in the general appearance of store interiors and one which plays an important role in forming the customer's first impressions. A congenial atmosphere, created by a lighting system designed in conformity with the architect's intentions, is an invaluable sales-aid. These conditions have been admirably satisfied in an installation recently carried out by the Berkeley Electrical Engineering Co., Ltd., using various "Mazdalux" fittings, in the new shoe retail premises of Russell and Bromley, Ltd., in New Bond-street. The interior of this building incorporates many unique features of design for which Lionel Brett and "Arcon" (Associated Architects) were esponsible.

The main lighting features of this store are three chandeliers, carefully chosen by the architects as part of the decoration scheme. These alone could not provide sufficient illumination, and consequently additional lighting was required. It was essential that this should be unobtrusive and not clash with the excellent design of the showrooms. This has been achieved by installing Mazda 80- and 40-watt fluorescent lamps in reflectors mounted either in special cornices or along the top of stock fixtures, according to the particular location. Adequate general illumination is thus provided, which also serves to brighten the ceiling and consequently counteract the glare of the naked "candle" lamps in the chandeliers. Supplementary direct lighting, from inconspicuous recessed ceiling "spots" has been included to introduce some highlights to relieve the comparatively flat effect produced by indirect lighting. These "spots" employ a 36-w./12-v. car headlight lamp situated behind a 3-in. plano-convex lens. In other parts of the store louvred ceiling fittings with 80-watt fluorescent lamps are used.

A novel and attractive feature is a central display table, the sides of which consist of plane mirrors inclined so that customers can readily see the shoes they are having fitted. Fluorescent lamps, carefully screened from direct view and having a complete cut-off of at 18 in. from the floor, are fitted beneath the mirrors to "floodlight" the shoes.

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The fashion shop, which is illustrated on the following page, is situated on Eastgate-row in the old-world city of Chester, and demonstrates how modern fluorescent tubes can be used effectively to bring the lighting of the shop into line with present-day requirements, without interfering in any way with the calm and stately atmosphere of its surroundings.

Good lighting is more than ever essential for a shop on the Row, as the overhanging beams allow little daylight to penetrate the interior of the shop. The fittings used on the ground floor are of a triple-tube louvred type, suspended at about 2 ft. 6 in. from the ceiling. These fittings not only give a good downward light, but also light up the ceiling, thus giving well dispersed general lighting and avoiding the glare which is common with so many fluorescent lamp installations. The fittings used in the first-floor showroom are of the ceiling type.

On account of the window lighting restrictions, the

The interior of the new Bond Street premises of Messrs. Russell and Bromley, Ltd.

Exterior of Messrs. Jaeger's Chester shop showing the bright, attractive interior without special window lighting.

window-backs of this shop have been removed in order to get sufficient lighting in the windows from the shop fittings, thus enabling passers-by to see the merchandise on display at all times of the day. Another advantage of having no window-backs is that the whole of the interior of the shop can be seen from outside, and the cheerful atmosphere within, provided by the lighting and general decorating scheme, acts like a magnet, providing a constant flow of customers into the shop.

The fittings were made by Messrs. Hume Atkins and Co., Ltd., of Letchworth, to the design of Debenhams, Ltd., Consulting Engineers' Department, who are responsible for the lighting of all Messrs. Jaeger Co.'s premises.

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A further instance of fluorescent lighting in aircraft is given by the installation recently completed in a Hermes IV aircraft built by Messrs. Handley Page, Ltd., which fully demonstrates the many advantages of this method of illumination. It was planned by lighting engineers of the B.T.H. Co.

Illumination in the main saloon is provided by 24 20-watt "warm-white" fluorescent lamps arranged in a continuous row along the centre line. The reflector, on the back of which the lamp holders and auxiliary gear are mounted, constitutes the cover plate into which extraction grills have been pierced to form part of the air conditioning system. 15-watt tungsten lamps are used in the toilets, dressing rooms, and the freight compartment.

Office Lighting

Among the finest banking office interiors in the City of London is that of Hambro's Bank, Bishopsgate, with its mahogany wall panels, pillars to match and gold leaf ornamentation. A fluorescent lighting installation recently completed at this office by Messrs. Trollope and Colls, Ltd., in collaboration with The General Electric Co., Ltd., is an example of the use of carefully designed fittings

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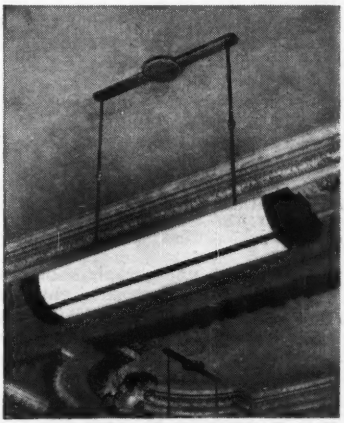

Close-up of one of the fittings installed at Hambro's Bank, Bishopsgate.

Lighting in a newspaper office.

(continued from previous page)

to harmonise with the architectural style of the building.

One problem, arising from the dark colouring of the walls, was to retain a light effect for the ends of the decorative fittings. This was achieved by using a gold colour relieved by a beaten matt finish so that a match is obtained with the gold leaf on the walls and pillars, the ends of the fittings remaining clearly visible in their natural tones instead of appearing nearly a solid black, as would have happened with a smooth gold finish. A similar finish is used for the mounting plates on the ceiling, which carry the gilded suspension rods for the fittings, there being excellent harmony with the existing ceiling decoration.

The thirteen fittings in this office have champagne-tinted glass side-panels, reeded "Perspex" bottom panels, and a glass top cover to protect the lamps from dust. Each contains three 5-ft. 80-w. fluorescent lamps, and the general illumination of the office is 20 lumens per sq. ft.

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The above photograph shows a new installation of fluorescent lighting at the offices of the "Liverpool Daily Post and Echo." Special care was taken by the Metrovick illuminating engineers in preparing their proposals to make sure that the new lighting would maintain, and, if possible, enhance the architectural character of the building.

The four main units, each containing four 80-watt 5-ft. warm white lamps are finished in bronze with panels of obscured reeded glass. In addition, twenty-nine 2-lamp units of similar construction and finish are used at the sides of the main office and in other offices. Auxiliary gear for each fitting is incorporated in the fitting. The level of illumination is 30 lumens per sq. ft.

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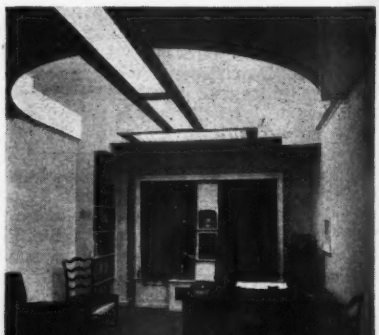
The decorative lighting in the director's office, which is illustrated below, was designed by B.T.H. lighting engineers.

A false ceiling, curved to give the entire room a delightful symmetry, is used to conceal "warm-white" lamps which impart a uniform and inviting brightness. In addition, a T-shaped, louvered unit containing "daylight" lamps provides excellent downward light distribution. An overall intensity of illumination at desk-top level of approximately 30 lumens per sq. ft. is obtained. The "warm-white" and "daylight" lamps combine to give a colour rendering pertinent to the room's decorative scheme and purpose.



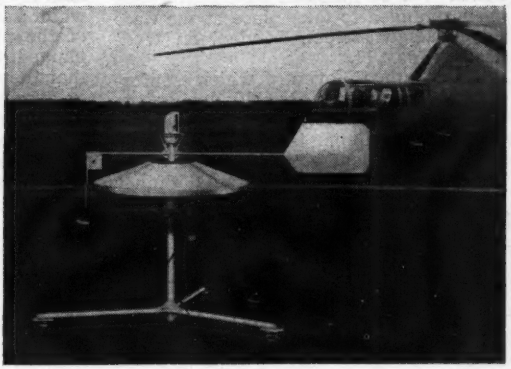
Showing an example of decorative and functional lighting in a private office by means of fluorescent lamps.

Landing Lights For Helicopters

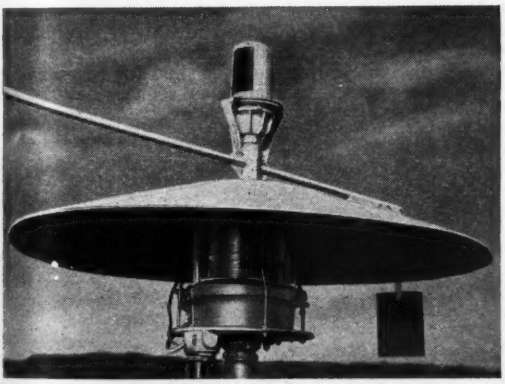
Following an experimental day-time helicopter mail service operated in East Anglia during the summer months, the Experimental Unit of British European Airways is now developing, in conjunction with the G.E.C., Ltd., new equipment for night trials.

A helicopter pilot judges his height during the last few feet of descent by observing the actual texture of the ground, noticing details such as the vertical faces of blades of grass and so on. It is necessary, therefore, for the landing area floodlight to give reasonably uniform illumination on vertical surfaces over an area of approximately 120 ft. in diameter. Bearing this requirement in mind the combined ground floodlight and wind direction indicator shown in the illustrations was constructed. It is equipped with a low-intensity airfield approach light fitting mounted 3 ft. 6 in. above the ground, containing a 250-watt class B1 projector lamp modelled to give its peak intensity at 2½ degrees below the horizontal. The conical screen over the lamp cuts off the light at approximately 3 degrees above the horizontal. An obstruction light fitting with a green glass is mounted on top of the unit.

With this unit adequate illumination was given over a radius of approximately 100 ft. and the texture of the ground could be appreciated from a sufficient height to enable the pilot to make a good touch-down. A well-defined shadow was cast in this area by the vertical bar on the end of the wind direction indicator, which obstructed the light over a few degrees in the horizontal and enabled the wind direction to be seen clearly from a distance of about 1,000 ft. The unit is fully portable, this being an essential requirement of a night-landing aid for a type of aircraft capable of using a great variety of small landing areas as may be convenient instead of being confined necessarily to prepared air-fields.



Right—Experimental landing light unit.



Left—Close-up of unit.

The G.E.C. also supplied two low-intensity approach light fittings for comparative test with other types of lighting to ascertain the most suitable form of beacon for locating the landing area. One was equipped with a red glass dome and a 250-watt class B.1 projector lamp, and the other with a clear glass and a 500-watt projector lamp of class A.1. Arrangements were made for flashing to provide an identification signal. The lamps were placed together in a corner of the landing field and could be picked out against a background of the lights of Peterborough at a distance of about two miles in clear weather.

I.E.S. ACTIVITIES

Annual Dinner

I.E.S. members will no doubt like to note that the Society's annual dinner, which will be followed by dancing, has been arranged to take place at the Café Royal, Regent-street, London, on Wednesday, May 11.

This annual event, which unfortunately could not be held during the war years, was revived in 1946. All who attended the dinner that year and those who were present at the summer meeting this year, when the annual dinner was the chief social event, will agree that it is an event not to be missed. The price of tickets will be about 25s. each. It is understood that full details will be issued by the I.E.S. in due course.

Visit to Southampton Docks

A party of about 25 members of the I.E.S. and friends spent a very interesting day on November 23 inspecting, under the guidance of the docks manager's representative, some features of the equipment in Southampton Docks.

During the morning an hour was spent on board the "Queen Mary," when the visitors were duly impressed by the beauty of the decoration and the lavish way in which special designs of lighting fittings had been resorted to. The loftiness of some of the public rooms and the homely restraint of the decorations in the first-class staterooms were features which were commented on.

After lunch the party visited the King George V graving dock, which had just been vacated by the "Queen Mary" and was being prepared for the reception of the "Mauretania." It was a fortunate circumstance that the dock was dry, as all agreed that the impression of its vast size is greatly emphasised when the water has been pumped out. The details of the pumping station were fully explained, and a point noted was the fact that the dock can be emptied in as little as three or four hours when the four main pumps are brought into operation.

Tea was served on the "Isle of Guernsey," and Mr. Forrest, who represented the docks manager in his unavoidable absence, welcomed the Society and introduced Mr. Ely, the docks electrical engineer, who gave some details of the special lighting that had been arranged for the working area alongside the docks and the quayside cranes. Regret was expressed that there was no opportunity to see the fluorescent lighting which had been introduced on the cross-Channel steamer s.s. "Falaise," but this vessel was unfortunately detained at Dover. Reference was also made to the scheme for a very fine new reception shed for ocean-going vessels, which was seen in course of

Some of the party on the "Queen Mary."

construction adjacent to Ocean Dock. This will be a double-decker shed equipped on very modern lines, including an up-to-date lighting system.

A feature of the dockside lighting, which was inspected after dark, is the special cut-off fittings mounted at about 25 ft. and spaced at 50-ft. intervals througout the length of the quayside. The scuttle-shaped design of the reflectors ensures not only a reasonable uniformity of lighting but complete cut-off immediately beyond the quay wall, so as to avoid glare in the eyes of pilots when they are navigating vessels up to the quayside.

Birmingham Centre

The second meeting of the Birmingham Centre was held on Thursday, November 4, 1948, at the Central Electricity Board's showrooms in Paradise-street, Birmingham, and took the form of an exhibition of new lighting equipment produced since 1939. Under the chairmanship of Dr. J. H. Nelson, the whole affair was a model of good organisation.

The exhibitors numbered 14, and included several prominent manufacturers of lighting equipment. Each exhibit was limited to four fittings per manufacturer, and only three minutes were allowed to each demonstrator to describe the exhibit. Many new and novel applications of both fluorescent discharge and tungsten filament lighting were shown to a large and appreciative audience.

There was a gratifying number of visitors from various technical organisations, and it was undoubtedly one of the most successful Sessional Meetings held by this Centre.

Glasgow and Edinburgh Centres

At Glasgow on October 28, and at Edinburgh on the following evening, Mr. A. W. Jervis lectured on "Problems Associated with Department Store Lighting." The lecture followed the lines of the author's paper at the I.E.S. Summer Meeting (see Trans. Illum. Eng. Soc. Vol. XIII No. 9, 1948), but as it was impracticable to demonstrate the full-size stage set of a store interior which was used at Harrogate, the author showed special miniature fittings with which he demonstrated such matters as the effect of screening fluorescent lamps with different types of louvres and visors.

Mr. Jervis stressed the importance of close collaboration between the stores management and the lighting engineer, who should combine their individual ideas to the development of the most satisfactory and practical solution of each particular application. Large stores generally consisted of several floors, each varying in heights of ceilings and nature of goods to be displayed. The locality and position of the store had also to be considered, and the quality of the installation had to bear some resemblance to the traditional atmosphere which some stores had attached to them. While sharp contrasts in the amount of lighting had to be avoided, general lighting by itself was not sufficient. Usually a combination of general and spot lighting was required; the general lighting providing a fair and pleasant evenness to the area with spotlights emphasising particular attractions or displays. Mr. Jervis said that the "natural" colour fluorescent lamp was of great value in store lighting on account of its improved colour rendering properties.

Leeds Centre

At the second Sessional Meeting of the Leeds Centre, North Midland Area, held on Monday, November 8, 1948, in the offices of the Yorkshire Electricity Board, Whitehall-road, Leeds, Mr. T. Catten presented a lecture entitled "Lighting of the R.M.Ss. 'Queen Elizabeth' and 'Queen Mary.'"

The author referred to the ships as large floating hotels, but emphasised the difference between conditions encountered afloat and those encountered ashore. The lighting installation, he stated, needed very careful consideration in view of:—

(a) Greater stresses and strains;
(b) Rigours of salt-laden atmospheres;
(c) High standard of electrical insulation required;
and
(d) Regulations laid down by Lloyd's and the B.O.T.

Factors affecting the design of the lighting installation which are not met with ashore were listed as:—

(1) Low headroom;

(Continued on page 273)

Forthcoming I.E.S. Meetings

(Provisional List)

MEETINGS AND VISITS IN LONDON

1949.

Jan. 11th. Sessional Meeting. MR. H. R. RUFF, MR. J. N. HULL, and MR. R. V. MILLS on **Transport Lighting with Fluorescent Lamps.** (*At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **6 p.m.**

Jan. 26th. Informal Meeting. Discussion on **Lighting in Coal Mines.** (*At Gas Industry House, 1, Grosvenor Place, S.W.1.*) **6 p.m.**

Feb. 8th. Sessional Meeting. MR. L. C. RETTIG on **The Lighting of Churches.** (*At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **6 p.m.**

Feb. Visit to a London Theatre. (Date and details to be announced.)

MEETINGS OF CENTRES AND GROUPS

1949.

Jan. 4th. MR. F. G. COPLAND on **Analysis of Lighting Problems in an Industrial Undertaking.** Joint meeting with The Works' Managers' Assn., The Incorporated Plant Engineers, and The Electrical Contractors' Association.) (*At the Lecture Theatre, British Electricity Authority Showroom, Whitechapel, Liverpool.*) **6 p.m.**

Jan. 4th. MR. H. R. RUFF on **"Rainbow Magic."** (*At the Technical College, Bow Street, Sheffield.*) **6 p.m.**

Jan. 6th. MR. J. M. WALDRAM, **Presidential Address.** (*At the South Wales Institute of Engineers, Park Place, Cardiff.*) **5.45 p.m.**

Jan. 6th. MR. D. E. BEARD on **Sports Lighting.** (*At Exeter.*)

Jan. 7th. MR. D. E. BEARD on **Sports Lighting.** (*At the South Western Electricity Board, Old Bridge, Bath.*) **7 p.m.**

Jan. 7th. MR. S. ANDERSON and MR. C. D. BROWN on **The Lighting of Trains and Public Service Vehicles.** (*At the City of Nottingham Gas Department Demonstration Theatre, Parliament Street, Nottingham.*) **5.30 p.m.**

Jan. 7th. MR. T. CATTEN on **Modern Ideas on Ship Lighting.** (*At the Electricity Showroom, Market Street, Huddersfield.*) **7.15 p.m.**

1949.

Jan. 10th. Problems night and informal discussion. (*At the No. 4 Sub Area Offices, Yorkshire Electricity Board, Whitehall Road, Leeds 1.*) **6 p.m.**

Jan. 13th. MR. J. H. LLOYD-OWEN on **Architecture.** (*At the Demonstration Theatre of the East Midland Electricity Board, Charles Street, Leicester.*) **6.30 p.m.**

Jan. 13th. Open Forum. (A panel of experts answering questions.) (*At the Reynolds Hall, Manchester College of Technology, Sackville Street, Manchester.*) **6 p.m.**

Jan. 13th. MR. J. N. BOWTELL on **High Voltage Fluorescent Tubes.** (At the *No. 1 Sub Area Office, Yorkshire Electricity Board, 45-53, Sunbridge Road, Bradford.*) **7.30 p.m.**

Jan. 19th. MR. G. E. CHAMBERS on **Mine Lighting.** (*At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.*) **6.15 p.m.**

Jan. 21st. Symposium of papers by members of the Birmingham Centre. (*At the Imperial Hotel, Temple Street, Birmingham.*) **6 p.m.**

Jan. 21st. MR. S. G. TURNER and MR. W. A. COOPER on **The Manufacture of Tungsten Filament and Electric Discharge Lamps.** (*At the Mining and Technical Institute, Cowbridge Road, Bridgend, Glam.*) **2.30 p.m.**

Jan. 27th. MR. H. W. CUMMING on **Electric Discharge Lamps for Floodlighting Projection.** (*At the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow, C.2.*) **6 p.m.**

Jan. 28th. MR. H. W. CUMMING on **Electric Discharge Lamps for Floodlighting Projection.** (*At the Heriot-Watt College, Chambers Street, Edinburgh.*) **6.30 p.m.**

Feb. 2nd. MR. C. R. BICKNELL on **The Application of Modern Flash Discharge Tubes.** (*At the Minor Durant Hall, Oxford Street, Newcastle-on-Tyne.*) **6.15 p.m.**

Feb. 3rd. DR. J. W. MITCHELL on **High Speed Photography.** (*At the South Wales Institute of Engineers, Park Place, Cardiff.*) **5.45 p.m.**

Feb. 3rd. MR. H. R. RUFF on **Transport Vehicle Lighting.** (*At Exeter.*)

Feb. 4th. MR. H. R. RUFF on **Transport Vehicle Lighting.** (*At the Grand Hotel, Bristol.*) **7 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting: summaries of proceedings at meetings (which should not exceed about 250–500 words) and any other local news are also welcome.)

(Continued from page 271)

(2) Small spaces;

(3) Inability to recess due to presence of many other services; and

(4) Difficulties attending maintenance.

Mr. Catten stressed the need for early co-operation between the lighting engineer and the decorative artist. After the receipt of the latter's drawings the lighting engineer was required to design the fittings, decide on the approximate layout and electrical loading, choose his diffusing media and relate all these considerations to production problems.

The author then, by means of a series of slides, showed the effects obtained in the various sections of the "Queen Elizabeth," and stated that, in all, 45,000 electric lamps were employed. The illustrations showed that the lighting installation was designed not merely with a view to providing illumination, but to serve as a decorative medium.

Mr. Catten then dealt on similar lines with the lighting of the "Queen Mary," and referred to the lighting of the S.S. "Caronia," details of which would be available in the near future.

A very lively discussion ensued in which the principal speakers were Messrs. J. D. Green, A. J. Johnson, T. C. Holdsworth, J. G. Craven, S. K. Spencer, N. D Smith, H. B. Mellor, and H. Moss.

Manchester Centre

A joint meeting of the Manchester Centre and the Association of Public Lighting Engineers was held on November 11, when Mr. W. D. Sinclair, A.M.I.E.E. gave a lecture on "Fluorescent Street Lighting." The meeting was well attended, and the keen interest in the subject was evident.

The lecture was opened with a general review of the problems encountered in street lighting and the audience reminded by demonstrations of the methods used to-day to achieve economical seeing by silhouette vision. The influence of glare on street seeing was stressed and the operation of glare control by the principles of cut-off and controlled cut-off was detailed.

To illustrate the significance of source brightness in glare an analysis of the six main glare factors was made and illustrated by experiment. As brightness was one of the most powerful elements it was shown that much could be done to alleviate glare by producing the working intensities required in the street at low levels of brightness.

The fluorescent lamp, it was claimed, provides us with such a source, and its merits as a street-lighting illuminant were discussed from many viewpoints. The principles of siting were similar to those used with orthodox sources, and the use of three-lamp units at 150 ft. was giving excellent results under widely differing conditions.

In the discussions several questions were asked—on maintenance and other matters—and it was stated that cleaning periods varied from 1,000-hr. intervals in the London area to 4,000-hr. intervals in other locations.

A hearty vote of thanks to Mr. Sinclair was proposed by Mr. Worswick and seconded by Mr. J. Harwood Lumsden.

Programme 1949-50

The Papers Committee in London and the various Centre and Group committees are already thinking of their programmes for the session beginning in October, 1949.

There appears to be some doubt in the minds of members of the society regarding how to go about offering a paper to be read in London. It is open to any member to offer a paper, in the first instance making the offer in writing to the secretary of the society sending a summary of about 500 words of the proposed paper. The offer is then brought before the Papers Committee who, provided the subject is a suitable one, will ask the author to submit a manuscript for the consideration of the Committee. (In some instances authors may submit a MS. in the first instance if their paper is already written.) The Papers Committee then study the paper with a view to its suitability (a) for publication in the Transactions of the Society, and (b) for presentation at a Sessional Meeting. Suitability for publication in the "Transactions" is considered first as only a small proportion of the members can be present at the London meetings, and it is, of course, on the contents of the "Transactions" that the Society is largely judged by other bodies, both in this country and abroad, and it is therefore essential that the standard should be high. The Papers Cimmittee would welcome offers of papers and also suggestions regarding informal meetings and visits.

News from France

The autumn number of "Lux," the French lighting journal, contains a number of interesting articles. M. Jean Chappat deals with the use of mains voltage fluorescent tubes in decoration, and considers the special properties of tubes in relation to their architectural use. The author describes the use of tubes in troffers to produce a decorative effect. The troffers are placed end to end and arranged in parallel lines or rectangles, the luminous lines produced being used to influence the apparent proportions of the room. Louvred tungsten lamps are sometimes used at the corners of squares so formed by fluorescent tubes to give emphasis lighting.

M. Cohu, another French lighting engineer well known in this country, describes the new lighting installation at the Gare Maritime du Havre, which has recently been reconstructed. The main hall of the terminal has a large vaulted ceiling, the panels of which are indirectly lighted by large numbers of concealed 25-w. fluorescent lamps, the main illumination produced is 15 l/sq. ft. The public rooms are lighted by a combination of direct and indirect lighting. The quays and platforms are lighted by 200-w. and 300-w. tungsten lamps in enclosed aluminium reflectors.

Some large-scale floodlighting appears to have been carried out in Paris last June for the fêtes of the Yacht Motor Club and the Marine Nationale, and the Grand Nuit de Paris. The River Seine and the Trocadero were floodlit from the Eiffel Tower by means of a battery of 80 3-kw. projectors placed on the second platform of the Tower. The throw from the Tower to the Trocadero was 600 metres (about 2,000 ft.), the mean throw to the river being 350 metres (about 1,100 ft.), and the resultant illumination of approximately 3 l/sq. ft. was sufficient to enable the public to follow the fêtes with little difficulty.

This issue of "Lux" also contains some notes and illustrations of decorative fluorescent table lamps, using 15-w. lamps and a number of other interior fluorescent lighting fittings.

New Lighting Fittings

The following are a few of the latest lighting fittings which have recently been introduced by the various manufacturers.

Designed for the new 2 ft. 20-w. or 40-w. fluorescent tube the LINOLITE "Linora" twin lamp fitting is for interior use. The sides are of moulded "Perspex" and louvres are used to shield the lamps from view. The fitting is a self-contained unit with the control gear readily accessible behind the removable louvres and reflector. It is supplied ready wired and is available for either direct fitting to the ceiling or for tube suspension. End plates may be had in ivory, bronze or chromium-plated.

THORN ELECTRICAL INDUSTRIES announce their new Atlas GD/2,240 fluorescent lighting fitting for home use which uses two 2 ft. 40-w. tubes of the "peach" colour. The outer diffusing cover is made of "Crinothene." The fittings are supplied for suspension on a single 12-inch down rod for existing ceiling points, electrical connections being made to a terminal block inside the body of the fitting. The control gear is included in the body of the fitting.

CROMPTON PARKINSON, LTD., have recently introduced a further three fittings, the "Astor," "Strand," and "Regent" for direct ceiling mounting. When fitted with suspension rods they are called respectively the "Adelphi," "Savoy," and "Richmond." They are all designed for commercial and decorative use. The "Royal" and "Richmond" use four 4 ft. 40-w. fluorescent lamps, the other fittings using only two lamps. In each case the side panels of the fittings are of lightly diffused reeded glass, and all use lattice louvres to screen the tubes from normal angles of view with the exception of the "Strand" and "Savoy," which employ a central fin. In all cases, both ceiling and pendant types may be arranged for continuous line mounting.

A further range of decorative lighting fittings is announced by EKCO-ENSIGN, LTD., for use with 2 ft., 4 ft., and 5 ft. fluorescent lamps. The standard finish of all metal-work on these fittings is in white stoved enamel, and the fittings are arranged for ceiling mounting or for suspension.

A lesson in efficiency told in type

Lighting tests have been made in almost every industry. But none tells the story so clearly as this test in hand typesetting. Speed and errors under various intensities of artificial light were compared with those in daylight, and here are the results :

AT 20 FOOT-CANDLES
output and accuracy almost as good as daylight.

AT 7 FOOT-CANDLES
output 10% down, errors increased.

AT 2 FOOT-CANDLES
output 25% down, errors doubled.

Yet the extra cost of the best lighting was only a twentieth of the value of the increased output.

But many business men are still not availing themselves of this low-cost production aid. The simplest way to make certain about your own lighting efficiency is to call in a Crompton Lighting Engineer. He knows the right lighting for every kind of work. He recommends the right kind of light as well as the quantity, taking account of the kind of units, the colour of the light and avoidance of glare. His services cost you nothing.

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The EDITOR Replies

The great fog has raised again the query whether "coloured" light gives the motorist a greater range of visibility than does "white" light. It may be recalled that this question was dealt with by the D.S.I.R. in Illumination Research Technical Paper No. 20, which was published by H.M. Stationery Office in 1937. The conclusion arrived at was that "none of the claims made in favour of using a coloured, and in particular a yellow headlight beam, rather than a white beam of no greater power, has been substantiated. The claim for a greater range of visibility in fog may be regarded as definitely disproved."

One of our readers, who is an optical practitioner, has sent us the following remarks on the subject of the illumination in opticians' consulting-rooms.

"I would like to make some comments on the notes in LIGHT AND LIGHTING (November, 1948, page 251), regarding the best way of lighting opticians' consulting-rooms. I agree with most of the Editor's remarks, but would like to amplify one or two points.

"In view of the close link-up between vision and illumination I think ophthalmic opticians should keep abreast of lighting developments, and so far as possible should use modern fitments in their consulting-rooms and other parts of their office. Many opticians use fluorescent lighting these days, and they seem very satisfied with this type of illumination.

"In the consulting-room there are times when darkness is desired, and it is very helpful to have a form of switching by which all the lights in the room can be extinguished by one switch handy to where the practitioner works. The type of illumination of the test chart will depend very much according to the particular chart employed, but in any case there should be some provision for varying the amount of illumination, as low illumination can be valuable for certain parts of the examination. Non-luminous retinoscopy and ophthalmoscopy are seldom used these days, and if they are, a special lamp is usually fitted. In the ordinary way good general lighting in the room is desirable, plus special provision for illuminating the reading chart which the patient usually holds in the hand. There is ample scope for ingenuity in illuminating the trial case in such a way that the lenses can be identified easily when the room is in darkness.

"As was pointed out, there is no agreed standard of illumination for the test chart itself, and this is of some importance in view of the fact that increased illumination facilitates the reading of the letters: 6-7 lm/ft.^{2} has been recommended in the past, but modern ideas favour a considerably higher standard of illumination and 25-30 lm/ft.^{2} would be considered generally as a satisfactory standard. Some of the internally illuminated test cabinets have a higher illumination than this, and so does the Turville Infinity Balance unit, which does, however, have a rheostat, so that any required standard of illumination is obtainable.

It has been suggested from time to time that LIGHT AND LIGHTING should include in its columns details of new lighting fittings with which a great proportion of readers are concerned. It is intended, therefore, to include such information in future, and it is hoped that manufacturers will send us brief details of new fittings as they are introduced, sending also either photographs or blocks.

SITUATIONS VACANT

ILLUMINATING ENGINEER required by large electrical company in London. Good experience of industrial and commercial lighting essential. State experience and salary required.—Box 785, "Light and Lighting," 32, Victoria-street, London, S.W.1.

VISITING DECORATIVE ADVISER. Well-known Paint Manufacturer invites applications for the above post from men of good appearance and pleasing personality, educated to matriculation standard. Applicants should possess outstandingly good colour sense and ability to convey ideas clearly to others. Experience in technical advisory service an asset but not essential.

Apply, giving full details of training and experience, to Box 786, "Light and Lighting," 32, Victoria-street, London, S.W.1.

REQUIRED FOR MADRID, competent young man to take entire charge of Fluorescence Section of Lamp Factory. —Applications, in duplicate, marked "Fluorescence Dept.," to Box No. 787, "Light and Lighting," 32, Victoria-street, London, S.W.1.

JUNIOR LIGHTING ENGINEERS required; write stating qualifications, salary. Applicants should hold City and Guilds Intermediate Certificate for Illuminating Engineering.—Box No. 788, "Light and Lighting," 32, Victoria-street, S.W.1.

Exhibition of Visual Aids

A daily showing of English and foreign films and film strips will form part of a comprehensive exhibition of visual aids on industrial design to be held from January 3 to 29, 1949, at the Murray House Exhibition Hall, Vandon-passage, Petty France, London, S.W.1. The exhibition has been arranged by the Council of Industrial Design.

LIGHT AND LIGHTING

32, Victoria Street, London, S.W.1. Telephones: ABBey 5215 and 7553

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